

Serial No. ~~10/047,584~~

REMARKS

This amendment is responsive to the office action dated November 3, 2004.

Claims 1-15 were pending in the application. Claim 1 was objected to. Claims 1-15 were rejected. No claims were allowed.

By way of this amendment, the Applicant has submitted replacement drawing pages for Figures 5 and 13.

Claim 1, 2, 5-8 and 13 have been amended. Claims 3, 4, 9-12, 14 and 15 remain unchanged.

Accordingly, Claims 1-15 are currently pending.

1. Priority

The Office Action stated that should the Applicant wish to claim the benefit of prior related applications, the claim must be made in the first paragraph of the specification.

The Applicant has reproduced the first paragraph of the specification below for reference.

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is related to and is a continuation-in-part of US Patent Application No. 10/659,575, filed September 10, 2003, which is a continuation-in-part of US Patent Application No. 10/315,336, filed December 10, 2002, which claims priority from earlier filed provisional patent application No. 60/338,893, filed December 10, 2001. This application is also related to and is a continuation-in-part of US Patent Application No. 10/658,613, filed September 8, 2003.

Serial No. 10/047,584

The Applicant believes that within this paragraph priority has been claimed both to US Patent Application No. 10/658,613 for support of the disclosure within the specification regarding the use of total internal reflection type lenses and the family of applications starting with US Patent Application No. 10/659,575, which is a continuation-in-part of US Patent Application No. 10/315,336, which claims priority from earlier filed provisional patent application No. 60/338,893 for support of the disclosure related to LED heat sink assemblies. Accordingly, the Applicant asserts that the present application has in fact claimed the benefit of the earliest filing date of December 10, 2001 for LED/heat sink assemblies and September 8, 2003 for LED/lens assemblies.

If this is incorrect, the Applicant requests further explanation as to the nature of corrections required to perfect the desired claim of priority.

II. Objection to Drawings

The drawings were objected to because Fig. 4 did not include the reference numerals indicated in the description of the figure provided at page 13 of the Specification. The reason that the reference numerals were lacking is that the figure designation in the specification at paragraph 16 was incorrect. The Applicant has amended the reference in the specification at paragraph 16 from Fig. 4 to now correctly read as Fig. 5. In addition, when reviewing Fig. 5, the Applicant discovered that the interior die was incorrectly referenced as 44. A corrected Fig. 5 has been included to change the incorrect reference numeral from 44 to 14.

The Examiner also stated that the Applicant should verify that the lead line associated with reference 304 in Fig. 13 actually extend into the circular hole. The Applicant has submitted a corrected Fig. 13 herewith showing the lead line for reference 304 extending into the circular hole.

Serial No. 10/047,584

In view of the corrections made, the Applicant believes that the Examiner's objections have been overcome. Approval and entry into the file is requested for revised drawing Figs. 5 and 13. Withdrawal of this objection is respectfully requested.

III. Objection to the Specification

The specification was objected to because the first paragraph on page 19 (paragraph 27) referred to "slot 206", however the slot should be correctly designated as reference numeral 306. The Applicant has amended the reference numeral in paragraph 27 to correctly read as 306. Withdrawal of this objection is respectfully requested.

IV. Claim Objections

Claim 1 was objected to because it was unclear as to what the Applicant was claiming with respect to the "interior die". The Applicant has amended Claim 1 to refer to this structure consistently as a mounting die. Further, an amendment to this terminology has necessitated amendments to the claims that depend from Claim 1. Accordingly, the Applicant has amended the claims that depend from Claim 1 as necessary to ensure consistency with the terminology, mounting die. Withdrawal of this objection is respectfully requested.

V. Rejection of Claims under 35 USC 112

Claim 6 was rejected under 35 USC 112, second paragraph as being indefinite. Specifically, it was stated that Claim 6 recites the limitation "light source" and that there is insufficient antecedent basis for this limitation. The Applicant has amended the term "light source" to "front luminescent portion" referring to a fully defined structural element

Serial No. 10/047,584

of the light emitting diode assembly. In view of this amendment, Applicant believes that Claim 6 is now definite and respectfully requests withdrawal of this rejection.

VI. Rejection of Claims under 35 USC 102

Claim 1 was rejected under 35 USC 102(b), as being anticipated by US Patent No. 6,274,924 (Carey et al.). Based on a broad interpretation of claim 1, the invention in Carey is interpreted to disclose an LED package with a front luminescent portion, a mounting base having a heat transfer plate on the rear thereof; an interior die that is thermally and electrically conductive and in thermal communication with the heat transfer plate; and a lens for directing light output from the light emitting diode and that the present invention is fully anticipated in view of this disclosure.

The disclosure within the Carey reference is the starting point for the disclosure of the present invention, not the result. Specifically, the Carey reference discloses a fully complete LED package that then must be incorporated into other devices that include additional heat sinking means to transfer the heat from the heat transfer plate on the rear of the package away from the LED to prevent malfunction and premature failure.

The Applicant has amended Claim 1 to clearly distinguish that the disclosure of the present invention is directed to an assembly that includes three distinct structural components. The first component is a light emitting diode package that includes an LED chip on its interior, a body that receives the chip, a heat transfer plate on the rear of the body to direct heat away from the LED chip and a luminescent portion on the front of the package to capture and direct the output from the front of the LED. This component may be a Luxeon emitter manufactured by LumiLeds and described in the Carey reference or any other similarly constructed high power LED available on the market. However, this is only one component of the overall device in Claim 1 as amended.

The second separate and distinct structural component is a heat sink assembly. The LED package is mounted onto the heat sink assembly with the heat transfer plate

Serial No. 10/047,584

on the LED package in thermal communication with a surface of the heat sink assembly. This component provides additional thermal mass and a heat dissipation pathway to direct heat away from the thermal transfer plate on the rear of the LED package. The heat sink assembly is an additional structural limitation within the claim and is not the same element or an equivalent replacement element for the heat transfer plate on the rear of the LED package. This heat sink is distinctly called out as different structure and is an additionally required claimed element.

Similarly, the third separate and distinct structural component is an optical lens received adjacent the luminescent portion of the LED package. The luminescent portion of the LED package is a separate element that is formed from a clear polymer and serves to protect the LED chip within the LED package and to capture and initially direct the light output from the chip. The Applicant has determined that the manner in which the built in luminescent portion of the LED package handles the light output is undesirable for the particular applications in which the Applicant wishes to utilize these LED packages. Accordingly, the Applicant has included an additional lens adjacent the luminescent portion of the LED package to further capture and direct the light output from the LED package.

Claim 1 of the present application has been amended to clearly delineate the separate and distinct structural components as detailed above. In a side by side comparison with the cited Carey reference, the present invention, like Carey, includes an LED package having an emitter chip, a mounting base, a thermal transfer plate on the rear of the mounting base and a luminescent portion on the front of the LED package to direct the output from the emitter chip. However, unlike the cited reference, the present invention further adds a separate and distinct lens component in front of and in addition to the luminescent portion of the LED package and adds a separate and distinct heat sink component behind the LED package that is in addition to the heat transfer element that is included within the structure of the LED package itself.

Since the claims of the present invention as amended include clear and distinct structural elements and limitations in addition to those found within the cited Carey

Serial No. 10/047,584

reference, the cited reference cannot anticipate the present invention under §102. Accordingly, in view of the claim amendments, this rejection is no longer believed to be supported and withdrawal of this rejection is respectfully requested.

VI. Rejection of Claims 1-5 and 7 under 35 USC 103

Claims 1-5 and 7 were rejected under 35 USC 103(a) as being unpatentable over US Patent No. 6,582,100 (Hochstein) in view of US Patent No. 6,481,874 (Petroski). The Examiner has stated that Hochstein discloses an LED mounting system wherein an LED with a front luminescent portion, a mounting base and a heat transfer plate which is received in thermal communication with a mounting die and an optical lens for directing light output from the LED package and that while Hochstein does not disclose the die being on the interior of a housing, Petroski discloses an LED heat dissipation system within a housing and that the present invention would be obvious in light of the combination of these references.

As stated above, the Applicant has amended the claims to more clearly reflect the actual structure of the present invention. The present invention in the claims as amended includes three separate and distinct components, a packaged LED assembly, a heat sink assembly and an optical lens in addition to the luminescent portion of the LED. Further, the Applicant has included limitations relative to the manner in which the LED is interfaced with the heat sink assembly. Principally, the claims require that the present invention have an alignment guide on the end of the heat sink assembly wherein the LED is received. The alignment guide is an important aspect of the present invention because it serves to align the optical axis of the luminescent portion of the LED package with a longitudinal axis of the heat sink assembly. The alignment feature is critical for then interfacing the heat sink and LED with the optical lens and for further incorporation of the entire assembly into a functioning device such as a flashlight. In the prior art, alignment has not been given a great deal of consideration and as a result, the ultimate far field beam image of the flashlight was of poor quality. The present invention provides for a unique assembly that ensures a quality and well aligned assembly during

Serial No. 10/047,584

each step of the assembly process. As the LED package is brought into mated relation with the heat sink assembly, the alignment guide serves to provide the assembler with the correct positioning of the LED package relative to the heat sink assembly thereby assuring that the LED will be located in the correct position within a finished device into which the overall assembly is incorporated. Further, by seating the LED package in this manner and providing the alignment guide on the heat sink assembly itself, the need for additional clamps or retaining clips is eliminated such as the type required to hold the Hochstein assembly together. This structure provides for the central axis of the LED to be in a precise and predictable location relative to the heat sink assembly thereby providing that the LED always be located in a predictable location within a finished device. By positioning the LED in such manner, the introduction of the optical lens in the required alignment is also facilitated thereby resulting in an assembly that is self aligning and not subject to the introduction of alignment error during the assembly process.

With regard to the addition of the Petroski disclosure, the claims have been amended to define the interior die more appropriately as a mounting die and the need for the assembly to reside within a housing has been eliminated. Therefore Petroski is no longer believed to be applicable in this particular rejection.

Since the present invention clearly discloses subject matter that is not found within either of the cited references Hochstein or Petroski either alone or in combination, the cited references cannot render the present invention obvious. Specifically, the present invention includes an additional optical lens and an alignment guide for aligning the LED package with the heat sink assembly that are not disclosed in the cited prior art references and therefore the cited references cannot render the present invention obvious. Further, with regard to the rejection of Claims 2-5 and 7, the Applicant asserts that since the subject matter in the base claim is not obvious in view of the cited references, the included limitations and patentable subject matter is imputed to all of the respective dependent claims. Accordingly, in view of the fact the claim 1 of the present invention is believed to be allowable over the cited prior art references, the respective dependant claims are also believed to be allowable.

Serial No. 10/047,584

VII. Rejection of Claim 6, 8, 10 and 11 under 35 USC 103

Claims 6, 8, 10 and 11 were rejected under 35 USC 103(a) as being unpatentable over US Patent No. 6,582,100 (Hochstein) in view of US Patent No. 6,481,874 (Petroski) and in further view of US Patent No. 6,547,423 (Marshall). The Examiner has stated that while Hochstein and Petroski as applied above do not disclose a lens including a total internal reflection collector portion, Marshall teaches the use of a collimation optic in conjunction with an LED and that the present invention would be obvious in light of the combination of these references.

The Applicant has amended both independent claims, Claims 1 and 8 to include the three distinct limitations discussed above. Specifically, the claims of the present invention require that the assembly include three distinct and separable structural elements, namely an LED package assembly, a heat sink assembly and an optical lens assembly that are then integrated into a device for further incorporation in a lighting device. Further, an alignment guide is introduced on one end of the heat sink to insure that the LED is aligned with a longitudinal axis of the heat sink when received in mated relation therewith. It is this predictability of alignment that allows the device of the present invention to result in a high quality end product.

The cited references do not alone or in combination teach or suggest that that an alignment guide be formed on the end of the heat sink to facilitate alignment of the central axis of the LED package with a longitudinal axis of the heat sink. Since, the present invention clearly includes limitations that are not taught in the prior art, the cited references cannot render the claimed subject matter obvious. Further, since the base independent claims 1 and 8 include subject matter that is not disclosed in the cited references, the dependent claims 6, 10 and 11 are also believed to be allowable. Accordingly, this rejection cannot be maintained in view of the Applicant's amendments to the claims. Withdrawal of the rejection is respectfully requested.

Serial No. 10/047,584

VIII. Rejection of Claims 13-15 under 35 USC 103

Claims 13-15 were rejected under 35 USC 103(a) as being unpatentable over US Patent No. 6,582,100 (Hochstein) in view of US Patent No. 6,547,423 (Marshall). The Examiner has stated that Hochstein discloses an LED mounting system wherein an LED with a front luminescent portion, a mounting base and a heat transfer plate which is received into an opening in the rear of the heat sink assembly with a spreader plate in thermal communication with the mounting die and the transfer plated on the LED and that while Hochstein does not disclose a total internal reflection collector optic, Marshall teaches a collimating lens and that the present invention would be obvious in light of the combination of these references.

The Applicant has amended Claim 13 to more clearly reflect the structure that is the subject of the present application. Specifically, the Applicant has defined the mounting die more clearly as a heat sink. The heat sink has an alignment guide in the rear surface thereof and an aperture extending from the alignment guide to the front surface of the heat sink. A spreader plate serves then to bridge from the heat transfer plate on the rear of the LED package to the heat sink thereby providing a thermal transfer path from the heat transfer plate to the heat sink.

In contrast, the structure in Hochstein provides for the LED to be mounted directly onto the heat sink plate with a retention slip that snaps over the LED package and retains it on the heat sink plate. The Hochstein device does not include an alignment guide to align the LED with a longitudinal axis of the heat sink, it only includes an aperture for the luminescent portion of the LED. Further, the retainer clip in Hochstein is simply not the same structure and does not serve the same purpose as the heat sink in the present invention. In Hochstein, the heat is transferred directly from the transfer plate on the LED packaged and into the heat sink plate behind the circuit board. The retainer clip while retaining the LED package in contact with the heat sink does not have any significant thermal mass and does not serve to provide any heat sinking capacity.

Serial No. 10/047,584

The present invention includes a heat sink structure into which the LED package is received. A spreader plate is provided to transfer the heat from the heat transfer plate on the rear of the LED package to the heat sink mass that is adjacent and surrounding the sides of the LED package. Further, the heat sink includes both an alignment guide and an aperture that aligns the central axis of the LED package with a longitudinal axis of the heat sink.

The cited references do not alone or in combination teach or suggest that that an alignment guide be formed in the rear of the heat sink to facilitate alignment of the central axis of the LED package with a longitudinal axis of the heat sink. Also, there is no teaching with regard to the use of a spreader plate to transfer heat from the LED package to heat sink capacity that surrounds the LED package. Since, the present invention clearly includes limitations that are not taught in the prior art, the cited references cannot render the claimed subject matter obvious. Further, since the base independent claim 13 includes subject matter that is not disclosed in the cited references, the dependent claims 14 and 15 are also believed to be allowable. Accordingly, this rejection cannot be maintained in view of the Applicant's amendments to the claims. Withdrawal of the rejection is respectfully requested.

Serial No. 10/047,584

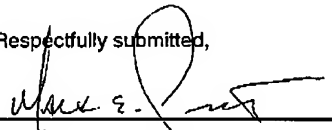
IX. Conclusion

Accordingly, claims 1-15 are believed to be in condition for allowance and the application ready for issue.

Corresponding action is respectfully solicited.

PTO is authorized to charge any additional fees incurred as a result of the filing hereof or credit any overpayment to our account #02-0900.

Respectfully submitted,



Mark E. Tetreault, Esq.
Reg. No. 48,289

BARLOW, JOSEPHS & HOLMES, Ltd.
101 Dyer Street, 5th Floor
Providence, RI 02903
(401) 273-4446 (tel)
(401) 273-4447 (fax)
met@barjos.com